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(54) Abstract Title
Toy vehicle

(57) A three wheel, remotely controlled toy vehicle (10) has a pair of driven, rear wheels (24, 26) and a steerable front wheel (28). The vehicle has a high center of gravity located towards the rear of the vehicle, which permits the vehicle to readily perform a wheelie and also to roll over. A roll cage (60, 64, 66) extends around the lateral sides of and over the vehicle body and causes the vehicle, when rolling sideways, to roll completely over back onto its wheels. A cam member (80) is positioned between the rear wheels, closer to one of the rear wheels, and lifts the closer one of the rear wheels off of a rolling surface when the vehicle is in the wheelie position on the rolling surface. Action of the other, surface contacting wheel causes the vehicle to spin about the cam member. The steerable front wheel is mounted on an axle (34) having one free end (70) and another end (72) pivotally coupled to the vehicle chassis for horizontal pivotal movement. A control arm (74) is between the axle and with a solenoid (38), which is also remotely controlled, to pivot the front axle and steer the vehicle. The cam member (80) may be fixed or it may be movable to a position (80') recessed within the vehicle.

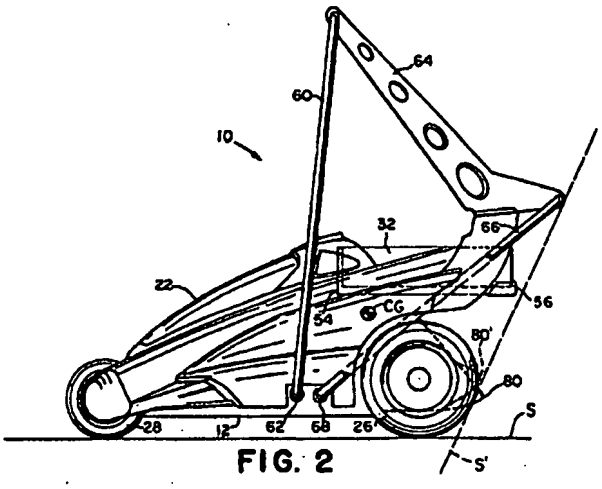

FIG. 2

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This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

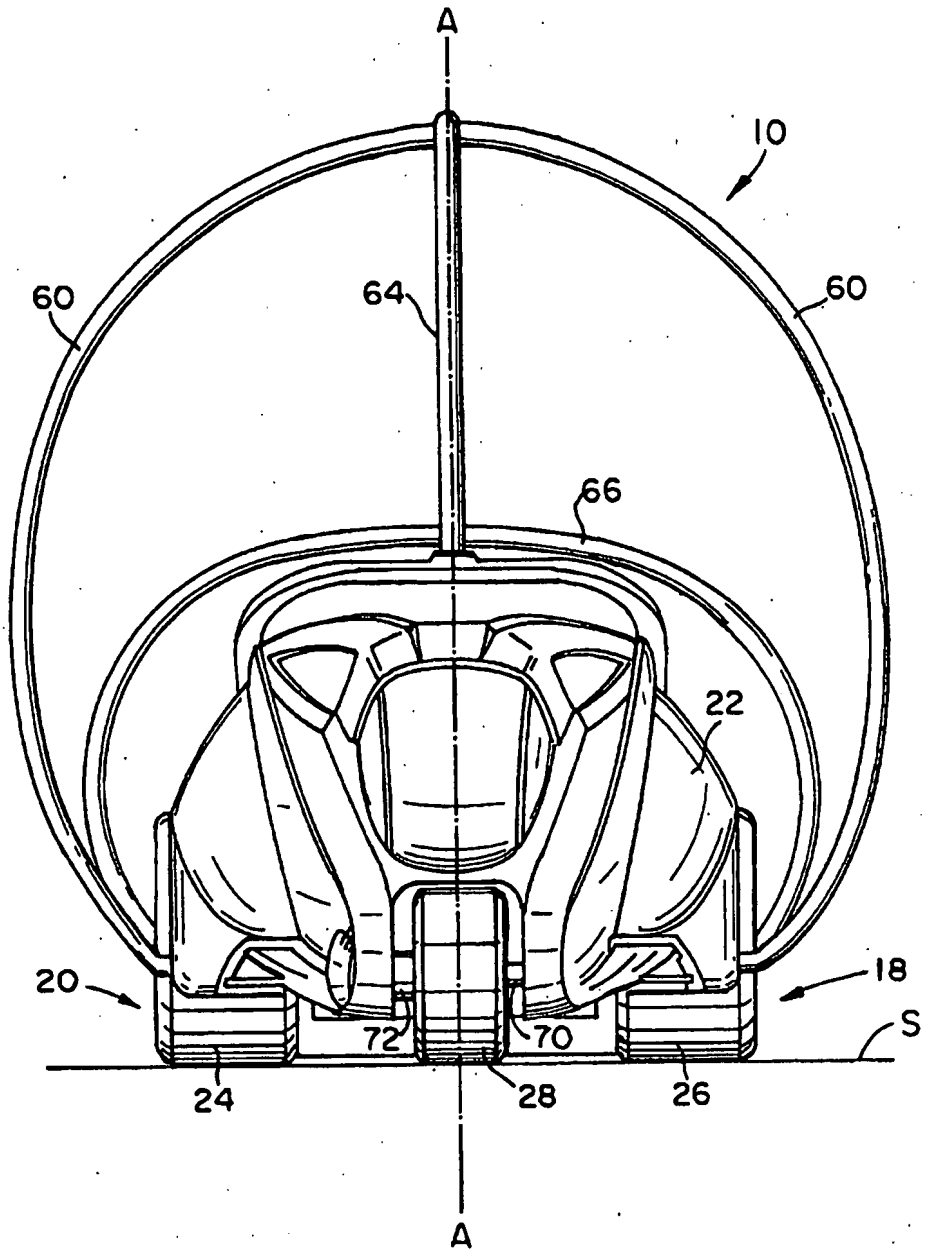

FIG. 1

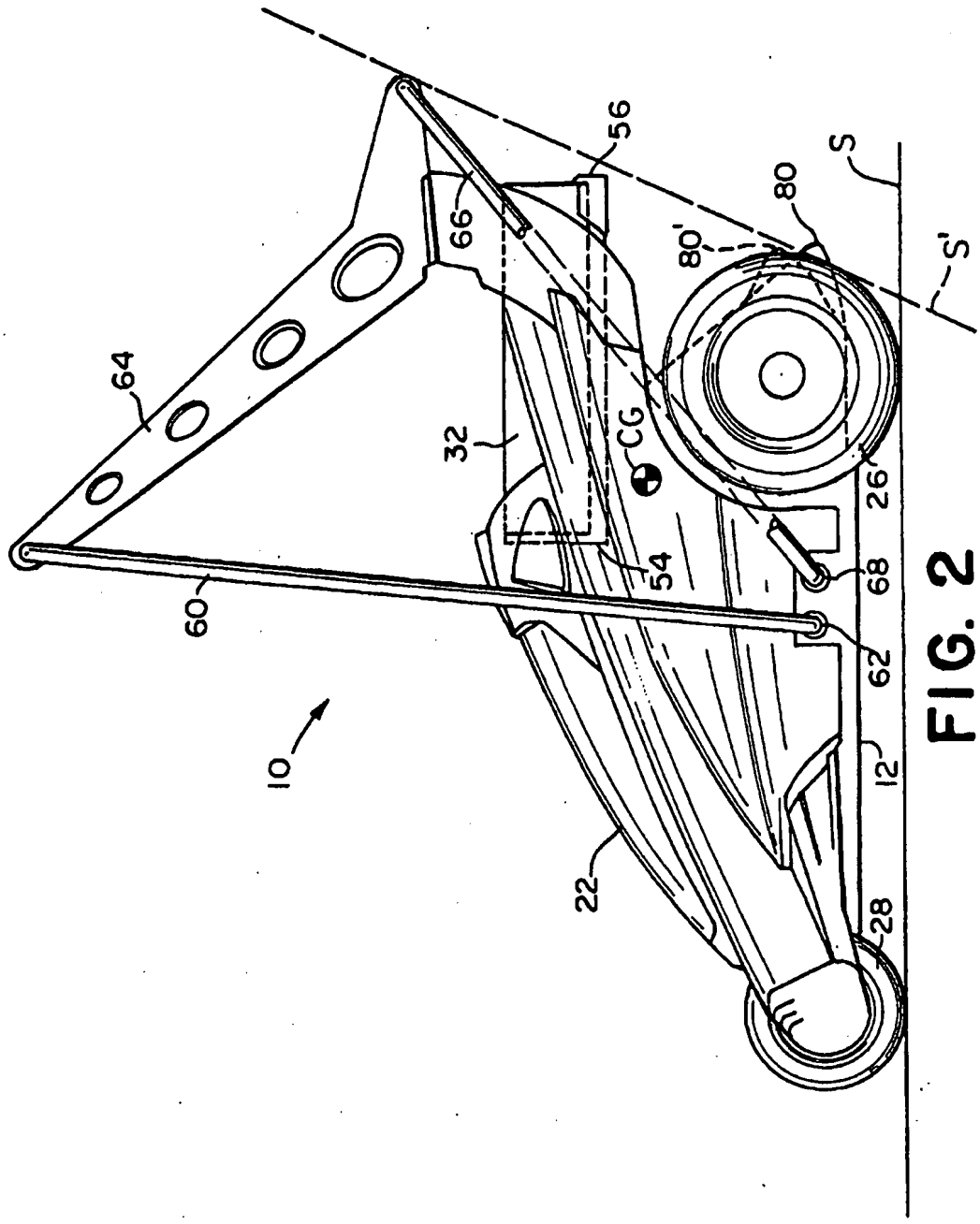

FIG. 2

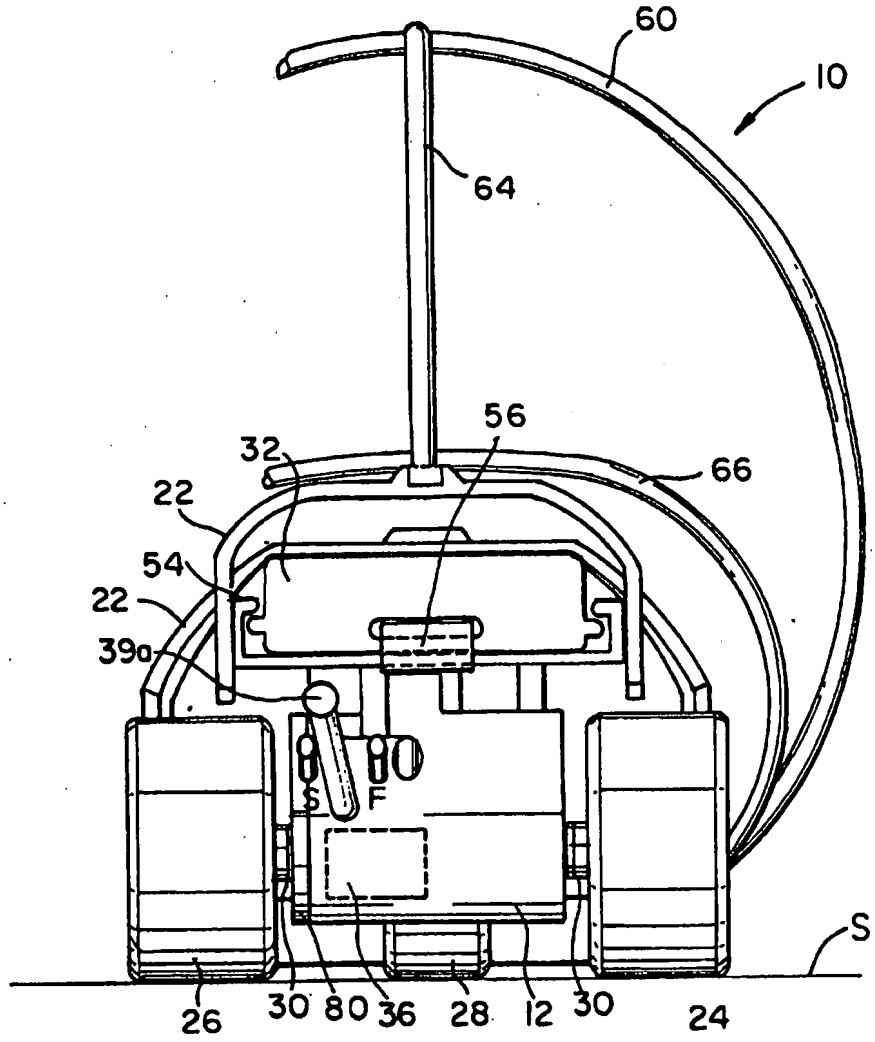

FIG. 3

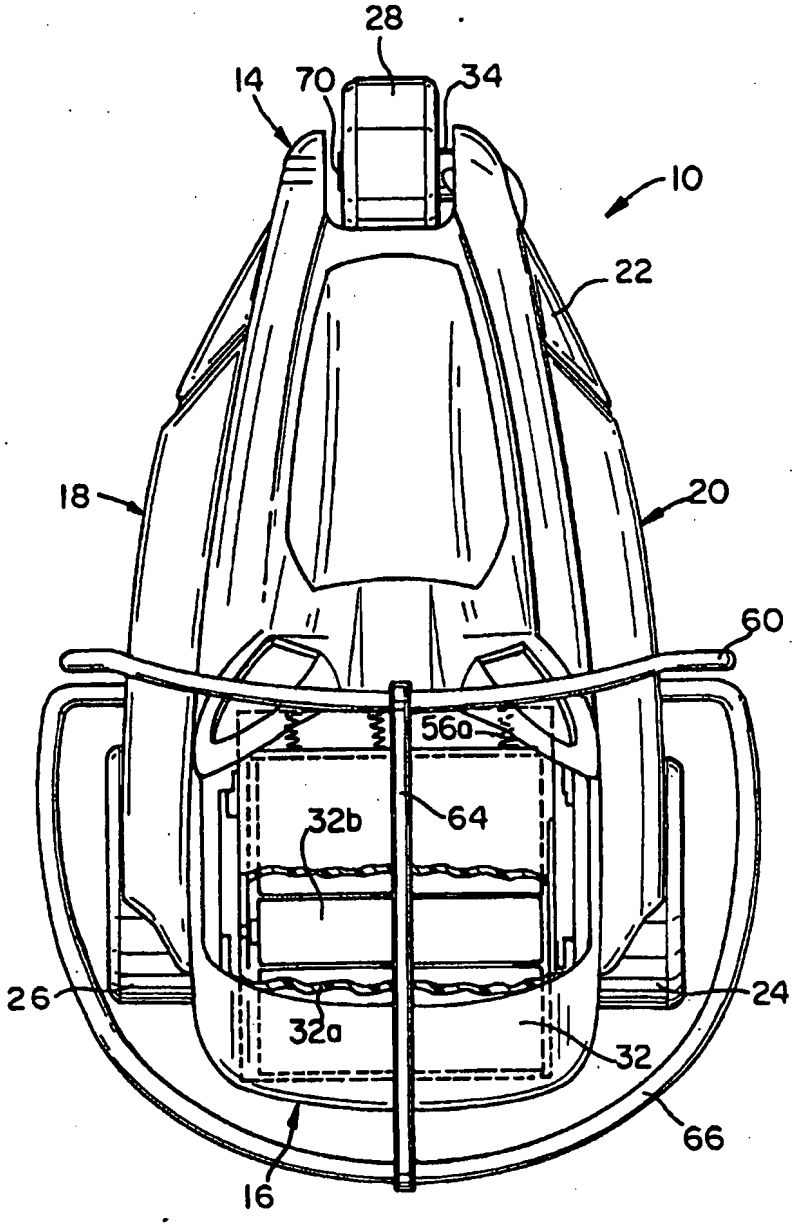

FIG. 4

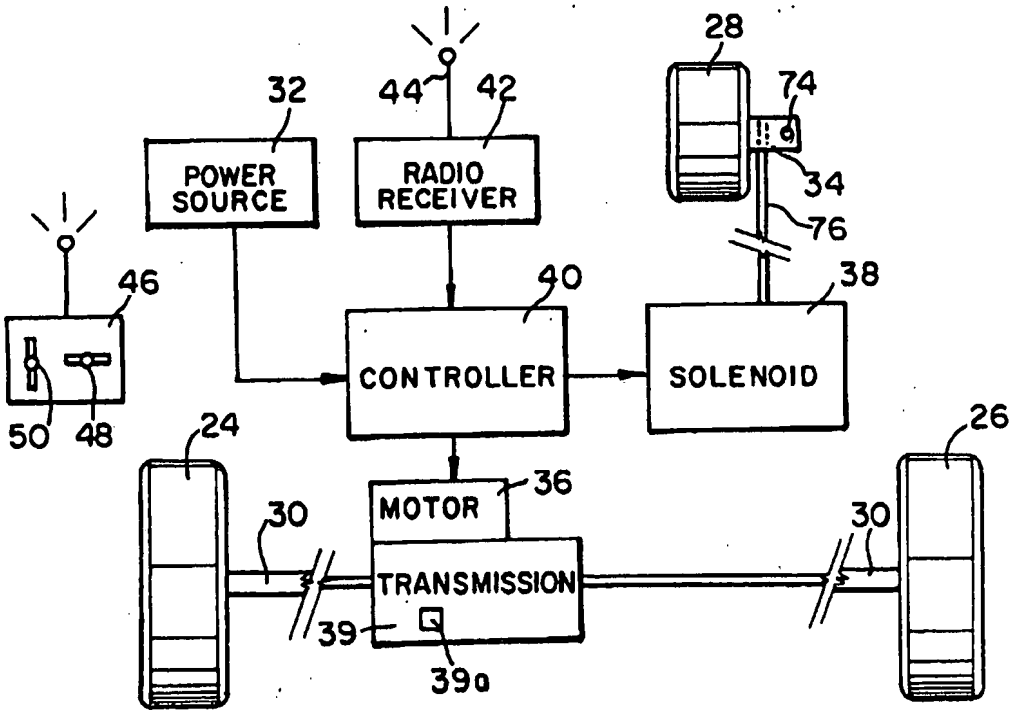
28
74
32
44
42
34
POWER SOURCE
RADIO RECEIVER
76
46
40
38
CONTROLLER
SOLENOID
50
48
24
26
36
MOTOR
30
30
TRANSMISSION
39
39a

FIG. 6

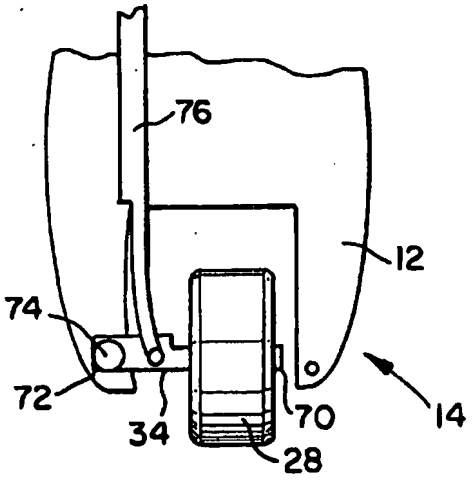
76
12
74
72
34
70
14
28

FIG. 5

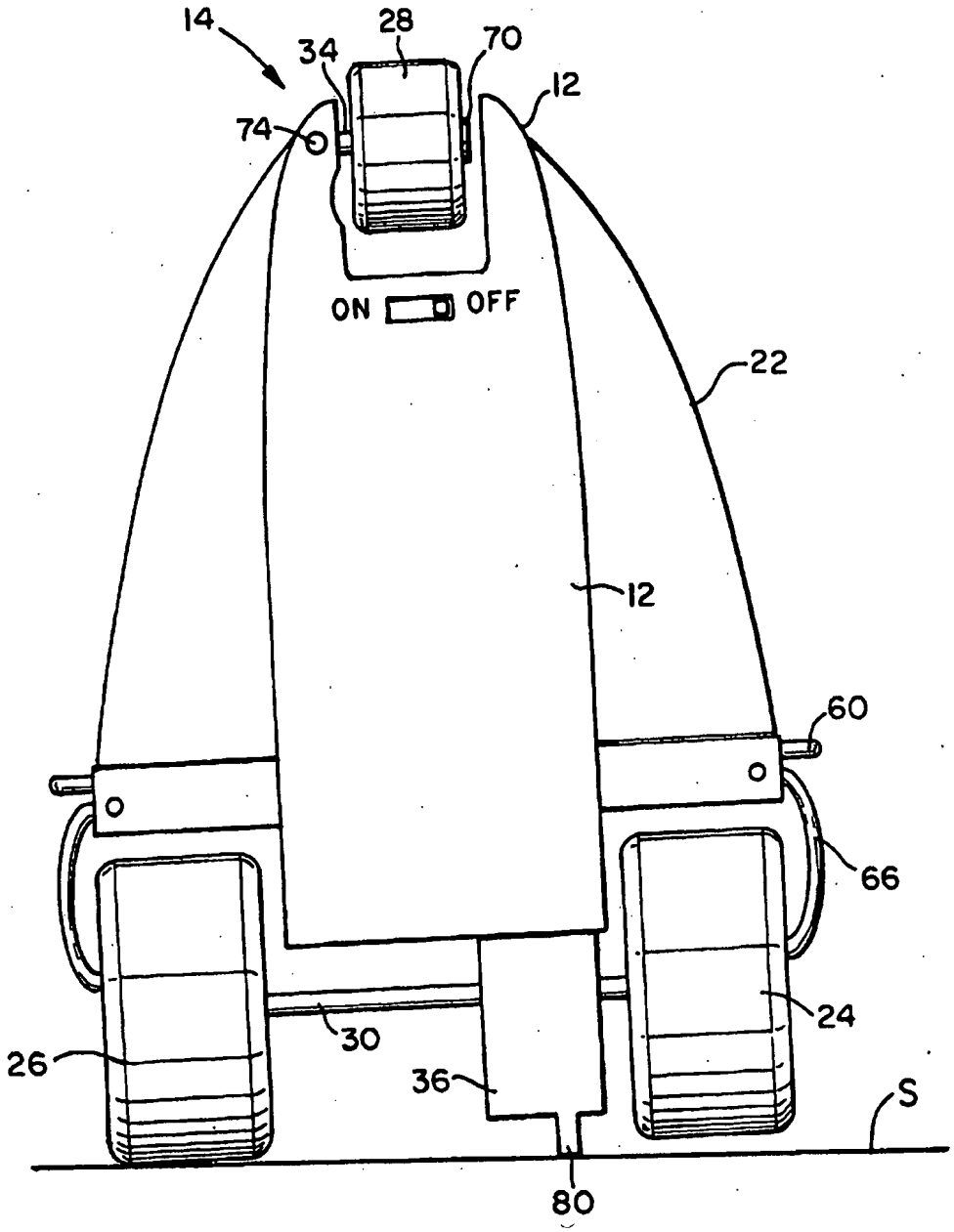

FIG. 7

TITLE OF THE INVENTION

TOY VEHICLE

BACKGROUND OF THE INVENTION

The present invention relates to toy vehicles and, in particular, to remotely controlled toy vehicles having unusual action capabilities.

Toy vehicles are well known. Remotely controlled, in particular, radio-controlled vehicles have come to constitute a significant specialty toy market. Manufacturers in this market attempt to duplicate well known vehicles as well as the latest in automotive developments, including specialty entertainment vehicles, such as four wheel drive vehicles, race car vehicles, and military vehicles. In addition, manufacturers constantly seek new ways and features to add innovative action to such toys to make such vehicles more versatile and/or entertaining.

Toy vehicles powered by electric motors are capable of operating at very high speeds. When performing maneuvers or sharp turns at high speeds, such vehicles have a tendency to roll or flip over, and often times end up-side down or on a lateral side, such that the vehicle wheels are no longer in contact with the surface, and thus, the vehicle is not operable. It would be advantageous to provide a vehicle which

always landed right-side up, with its wheels contacting the surface.

Such toy vehicles are also known to perform stunts, such as the "wheelie", in which the front end of the vehicle lifts off of the ground and the vehicle travels only on its rear wheel(s). It would be desirable to provide a toy vehicle capable of readily performing a wheelie and other stunts like a rapid, in-place spin where the vehicle rotates in place (or essentially in place), such as on one wheel, at high speed generally about a vertical axis extending through the vehicle so as to be capable of operating with its front wheel(s) off of the ground to increase the play value of the toy vehicle.

SUMMARY OF THE INVENTION

In one aspect, the invention is a remote control toy vehicle operable on a rolling surface and including: a chassis having a front end, a rear end, and two opposite lateral sides; a body coupled with the chassis; at least one rear wheel mounted proximate the chassis rear end for rotation relative to the chassis; a front axle mounted proximate the chassis front end, the front axle having at least one front wheel mounted for rotation thereon relative to the chassis; and a motor drivingly coupled with the at least one rear wheel; the vehicle being characterized by a curved roll bar extending from the opposite lateral sides of the chassis along the opposite lateral sides and over the top of the chassis and the body spaced away from the body along the top and sides of the body.

In another aspect, the invention is a toy vehicle for operating on a rolling surface and including: a chassis having a front end, a rear end, and two opposite lateral sides; a pair of rear wheels mounted proximate the chassis rear end, the rear wheels being mounted on the opposite lateral sides of the chassis for rotation relative to the chassis; at least one motor drivingly coupled with at least one of the pair of rear wheels; and a front axle mounted proximate the chassis front end and having at least one front wheel mounted for rotation thereon relative to the chassis; characterized by the front axle being the only front axle of the vehicle and being located generally in the middle of the front end between the opposite lateral sides, the front axle having two opposite ends, a first, free end and a second end connected with a remainder of the vehicle by a pivot for pivotable movement of the front axle relative to the chassis.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of a preferred embodiment of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings an embodiment which is presently preferred. It should be understood, however, that the invention is not limited to the precise arrangement and instrumentalities shown. In the drawings, which are diagrammatic:

Fig. 1 is a front elevation of a toy vehicle in accordance with the present invention;

Fig. 2 is a side elevation of the toy vehicle of Fig. 1;

Fig. 3 is a rear elevation of the toy vehicle of Figs. 1 and 2, with a roll bar thereof broken away;

Fig. 4 is a top plan view of the toy vehicle of Figs. 1-3;

Fig. 5 is a partial top plan view of a front portion of the toy vehicle of Figs. 1-4;

Fig. 6 is a schematic block diagram illustrating a controller of the toy vehicle of Figs. 1-4; and

Fig. 7 is a partial bottom plan view of the toy vehicle of Figs. 1-4 in a wheelie/spin position.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the drawings, like numerals are used to indicate like elements throughout. Certain terminology is used in the following description for convenience only and is not limiting. The words "right", "left", "lower", "upper", "top", "bottom", "horizontal", "vertical", "front" and "rear" designate directions in the drawings to which reference is made. The terms "inwardly" and "outwardly" refer to directions toward and away from, respectively, the geometric center of the toy vehicle or designated parts thereof. The terminology includes the words above specifically mentioned, derivatives thereof and words of similar import.

Referring now to the drawings in detail, a preferred toy vehicle capable of rolling over and landing on its wheels and also of performing a spinning wheelie on a rolling surface "S" is indicated generally at 10 in Figs. 1 through 4. The

vehicle 10 preferably comprises a chassis 12 having a front end 14, a rear end 16, and two opposite lateral sides 18, 20. The chassis 12 may be provided with automotive detailing, such as a frame, suspension, motor and/or drive train details. The detailing may be three dimensional (functional or non-functional) or merely surface ornamentation provided to simulate such functional elements. For example, the chassis 12 may be provided with such detail as a bank of header pipes, an external fluid cooler (oil, transmission, or both), front and rear operating suspension springs, *etc.*

The vehicle 10 also preferably includes a body, indicated generally at 22, mounted on the chassis 12. The body 22 is preferably configured with opposite lateral sides and a top to essentially cover and hide from view at least a portion of the lateral sides 18, 22 and a top portion of the chassis 12. The body 22 may include some nonfunctional surface detailing (not shown), such as the form of a driver, suspension elements, a turbine, an exhaust system, a motor and/or drive train details. The chassis 12 and the vehicle body 22 are constructed of, for example, plastic or any other suitable material, such as wood or metal.

The depicted vehicle 10 has an aerodynamically-shaped automobile style with the front end 14 being sharp or somewhat pointed in plan and side elevation views, and a height gradually increasing toward the rear end 16. Although the vehicle 10 is shown having a generally angled form and aerodynamic styling, the vehicle 10 could be in the form of other aerodynamic styles or conventional passenger car, truck, and other vehicle styles. The vehicle 10 may also be equipped

with lights (not shown), which are illuminated when the vehicle is being operated. Although the presently preferred embodiment of the vehicle 10 comprises a chassis 12 and a body 22, it is within the scope of the invention that the toy vehicle could be made without a body portion, or with a chassis integral to the body or with the body and chassis collectively formed by laterally opposing shells.

The presently preferred embodiment of the vehicle 10 has two rear wheels 24, 26. The rear wheels 24, 26 are mounted on a rear axle 30 proximate the rear end 16 of the chassis 12 in opposing relation on the opposite lateral sides 18, 20 of the chassis 12, for rotation relative to the chassis 12. Although the presently preferred embodiment of the vehicle 10 has two rear wheels 24, 26, a vehicle having a single rear wheel, or more than one pair of rear wheels could be designed which is still within the scope of the invention.

The vehicle 10 also has at least one front wheel 28 mounted on a front axle 34 proximate to the front end 14 of the chassis 12 for rotation relative to the chassis 12. The front wheel 28 is mounted so that the outermost portion thereof is spaced or extended beyond the front end 14 of the chassis 12. However, the chassis 12 (or body 22) could be extended (or the front wheel recessed) to protect the front wheel 28. In the presently preferred embodiment, the front wheel 28 has a diameter which is less than a diameter of the rear wheels 24, 26, in order to provide the vehicle 10 with the aforementioned aerodynamic shape. In addition, it is also preferred that front wheel 28 and the front axle 34 are the only front axle and wheel and are located in the middle of the

front end 14 along a longitudinal center line of the vehicle 10, indicated as line A - A in Fig. 1 between the opposite lateral sides 18, 20. The front and rear wheels 28, 24, 26 may be constructed of any suitable material, such as plastic, wood, or metal or other suitable materials commonly used for tires. Preferably, the front and rear wheels 28, 24, 26 are constructed of rubber. The wheels can also be equipped with nubs (not shown) to improve traction when the vehicle 10 is operated off of a hard, smooth surface.

It will be understood by those of ordinary skill in the art that although the invention is described herein in terms of the preferred, three-wheeled embodiment, aspects of the present invention could be embodied in a two-wheeled vehicle (*i.e.* a motorcycle) or a vehicle having four wheels, such as a conventional automobile or truck, or more than four wheels. Thus, the present invention is described in terms of a three-wheeled vehicle for preference only, and is not limited to a three-wheeled vehicle.

The vehicle 10 is driven by at least one and preferably only one reversible, electric motor, indicated generally at 36 (in phantom in Fig. 3), which is drivingly coupled with at least one and preferably with both of the rear wheels 24, 26, for driving the rear wheels 24, 26. Since the electric motor 36 is reversible, the rear wheels 24, 26 can be driven in either the forward or reverse direction. The drive motor 36 preferably is mounted to the vehicle chassis 12 within the vehicle body 22 and located proximal the rear end 16 of the vehicle 10. The two rear wheels could also be

driven in common by paired motors or separately by separate motors.

Referring now to Fig. 6, the drive motor 36 is drivingly coupled to the rear wheels 24, 26 by way of a transmission 39, which is interconnected to the rear wheels 24, 26 by way of the rear axle 30 in a conventional manner. That is, the rear wheels 24, 26 are mounted on the axle 30 with a final drive gear (not depicted) of the transmission 39. The final drive gear may be driven through one or more reduction gears (not depicted) and at different top speeds through different gear trains via a selection switch 39a. Preferably the motor 36 is disposed closer to the rear end 16 and one of the lateral sides 18, 20 of the vehicle 10 to shift the weight of the vehicle 10 to the rear end and to the one lateral side to enhance the ability of the vehicle 10 to perform a spin when in the wheelie position, as discussed in greater detail below.

The drive motor 36 is electrically connected to a controller 40, which is connected to a radio receiver 42, such as a high frequency receiver circuit, which is connected to an antenna 44 for receiving and processing control signals transmitted from a source remote to the vehicle 10, such as a remote control device 46. The remote control device 46 preferably includes a toggle or slide control member 50 to generate signals which control the operation of the drive motor 36. For instance, by moving the toggle 50 in a first direction, the vehicle 10 is moved in a first, forward direction and by moving the toggle 50 in a second, opposite direction, the vehicle 10 is moved in a second, reverse

direction, as will be readily understood by those of ordinary skill in the art. Also as understood by those of ordinary skill in the art, the amount of lateral movement of the toggle 50 may variably control the vehicle speed. For instance, moving the toggle 50 as far as possible in either the forward or reverse direction commands the vehicle 10 to travel at top speed in such direction while moving the toggle only half as far may command the vehicle 10 to travel only about half as fast.

The controller 40 and radio receiver 42 are preferably mounted on a printed circuit board or "PCB" (not shown) located within the vehicle 10 between chassis 12 and body 22. Preferably, the PCB is mounted near a mid-point of the chassis 12. The controller 40, radio receiver 42, remote control device 46, and drive motor 36 are entirely conventional based on well known, existing radio controlled vehicle designs, such as disclosed in U.S. Patent No. 5,135,427, which is incorporated by reference herein in its entirety. Such control systems can be obtained directly from manufacturers, such as Taiyo Kogyo of Tokyo, Japan and others or U.S. distributors selling radio control vehicle products and/or parts. Since the vehicle 10 of the present invention uses the same or similar controller circuitry as described in U.S. Patent No. 5,135,427, these elements will not be further discussed herein.

Although the presently preferred embodiment toy vehicle 10 is remotely controlled via radio signals, it should be understood that other types of remotely controlled toy vehicles (both hard wire and other types of wireless control)

as well as toy vehicles which are not controlled are also within the scope of the invention. Moreover, although propulsion of the vehicle 10 is entirely conventional like that of any number of arrangements previously used in radio controlled, electric toy vehicles known to those of ordinary skill in this art, other means could be used, such as a wind-up or spring actuated motor means, hydraulic, pneumatic, or other inertial and electromagnetic prime movers could be substituted for the electric drive motor 36.

The vehicle 10 preferably has a center of gravity located relatively high in the combined chassis/body 12/22 and toward the rear end 16 of the vehicle 10 in order to facilitate the performance of certain stunts, such as a wheelie and a roll-over. In order to provide the vehicle 10 with such a high center of gravity, the vehicle 10 includes a weight removably mounted above the rear wheels 24, 26. The weight preferably comprises a removable power source 32, for supplying the vehicle's power for powering the electric motor 36, the circuitry of the controller 40 and radio receiver 42 and any other electrical components that may be provided. The power source 32 preferably is contained within the body 22. Preferably, the power source 32 comprises a removable, rechargeable battery pack, such as a 6.0 volt Ni-Cd rechargeable battery pack (not depicted) or a case 32a containing a plurality of separate batteries 32b (e.g. 4 AA batteries) as shown in Fig. 4, which are removable from the case 32a. The preferred power source 32 is substantially rectangular in shape and is slide-fit into a battery tray 54, which is also substantially rectangular in shape, so that the

battery pack is received and held therein. The power source 32 is releasably secured within the tray 54 by means of a coupling in the form of a tab or locking clip 56. The locking clip 56 is fixedly secured with and extends upwardly from the inner side of the tray 54. The locking clip 56 is resilient and self-biased such that the clip engages with the power source 32 when it is fully received within the tray 54.

Referring particularly to Figs. 2 and 4, the power source 32 is slide-fit into the tray 54 from the rear end 16 of the vehicle 10 through an opening in the rear end 16 of the vehicle 10 and the tray 54. The locking clip 56 is biased or moved downward in order to slide the power source 32 into the tray 54. When the power source 32 is received within the tray 54, the locking clip 56 springs upward into its normal position, such that the power source is held securely within the tray 54. The power source 32 and the tray 54 may also each include complementary tabs (not numbered) along their respective sides for further securing the power source 32 within the tray 54.

When the power source 32 is received within the tray 54, electrical contacts (not shown) of the power source 32 are electrically connected to complementary electrical contacts in the form of springs 56a on the tray 54, which in turn are electrically connected to the controller 40 and radio receiver 42 and through the controller 40 to the motor 36 so that the power source 32 provides electrical current to the motor 36.

As best shown in Fig. 2, the tray 54, including the power source received therein, is disposed on the chassis 12 over the rear axle 30 and rear wheels 24, 26 so that the

center of gravity of the vehicle 10 is located relatively high within the chassis/body combination 12/22 and towards the rear end 16 of the vehicle 10, at or near the point 56, to facilitate the vehicle's ability to both roll laterally or sideways and perform a wheelie. The removable power supply 32 preferably constitutes a significant fraction of the total weight of the vehicle, for example, about fifteen percent or more of the total vehicle weight.

In order to further enhance the vehicle's play value, the vehicle 10 has a roll cage including a curved, preferably generally circular roll bar 60 extending from the opposite lateral sides of the chassis 12 along the opposite lateral sides 18, 20 and over the top of the vehicle 10, proximate a center location along of the chassis 12. The roll bar 60 allows the vehicle 10, when rolling laterally (sideways), to roll over completely and land right-side up with the vehicle wheels 24, 26, 28 contacting the rolling surface S on which the vehicle is supported. Preferably, the roll bar 60 circumscribes the lateral sides 18, 20 and top of the chassis 12 and of the body 22 and is spaced away from the body 22. As depicted, the roll bar 60 extending in an arc about the chassis 12 and body 22 of at least 180 degrees, preferably more than 180 degrees, as depicted.

The roll bar 60 preferably comprises a length of spring steel formed to be generally circular. Generally circular is intended to cover continuously curved shapes which are not exactly circular, including but not limited to generally elliptical and other, even less exact variations on exactly circular shapes. The roll bar 60 is received within

holes 62 located on each of the lateral sides 18, 20 of the chassis 12. The body 22 also preferably includes a support bar 64 extending from a rear part of the body 22 to a point above the body 22. The roll bar 60 extends through a hole in the support bar 64. The support bar 64 prevents the roll bar 60 from pivoting towards the front end 14 or rear end 16 of the vehicle 10.

In order to further insure that the vehicle 10, when rolling laterally, rolls over completely and lands with its wheels 24, 26, 28 contacting the rolling surface S, particularly when spinning on its rear end, the roll cage of vehicle 10 preferably includes a second roll bar 66 extending from the lateral sides 18, 20 of the vehicle 10 and around the rear end 16 of the chassis 12 and body 22 of vehicle 10 preferably at a height above the top of the body 22 for the vehicle 10 shown. The second roll bar 66, like the first roll bar 60, is received within holes 68 on the lateral sides 18, 20 of the chassis 12 proximal a center location along the chassis 12 and is supported by the support bar 64, at an opposite end of the support bar 64 from the point at which the first roll bar 60 is supported by the support bar 64. The first and second roll bars 60, 66 each circumscribe the sides 18, 20 and the top of the chassis 12 and body 22 of vehicle 10 and are spaced away from the sides 18, 20 and top of the body 22. The support bar 64 may comprise any rigid material of suitable strength to hold the first and second roll bars 60, 66 over the vehicle 10 while the vehicle is rolling and to prevent pivotal movement of the first and second roll bars 60, 66. In the presently preferred embodiment, the support bar 64

is constructed of a rigid polymeric material. It will be understood by those of ordinary skill in the art that the roll cage could be otherwise constructed, such as of a series of structures, including exhaust pipes, spoilers, canopy, wing, etc. The support bar 64 and/or the first and second roll bars 60, 66 may include surface ornamentation or detailing, as desired.

Referring now to Fig. 5, the front axle 34 of the vehicle 10 is pivotable. In the presently preferred embodiment, the front axle 34 has a first, free end 70 and a second end 72 coupled to a steering mechanism such that the at least one front wheel 28 is steerable. More specifically, the second end 72 of the front axle 34 is connected by a pivot 74 to the chassis 12 for pivotable movement of the front axle 34 relative to the chassis 12. The pivot 74 is provided by a pin, shaft, rod or the like extending through the second end 72 of axle 34 preferably from the chassis 12. A control arm 76 is also coupled to the front axle 34 between the front wheel 28 and the second end 72. The control arm 76 is capable of moving the front axle 34 on the pivot 74, which moves the front wheel 28 about the pivot 74, thereby steering the vehicle 10. Although it is preferred that the front axle 34 has a free end (70), the free end 70 could be received in a guide such as a channel or connected to a guide or an additional actuator or control arm, all still permitting or providing rotation of the axle 34 about the pivot 74.

Referring now to Fig. 6, the control arm 76 is coupled to an electric steering device 38. The steering device 38, like the drive motor 36, is connected to the

controller 40, which receives command signals transmitted from the remote control device 46 and received by the radio receiver 42. The remote control device 46 includes a toggle switch or slide 48 or other means, for controlling the steering device 38 and thus, movement of the control arm 76 and the front wheel 28. The steering device 38 and coupling to the controller 40 are conventional, and known by those of ordinary skill in the art. The device 38 is preferably a solenoid including a fixed magnet and a rotatable coil with a centering spring. Supplying power in either direction to the coil causes the coil to rotate a fraction of a revolution in either of two opposing directions from a central or neutral angular position of the coil, which corresponds to a straight running position of front wheel 28 with front axle 34 perpendicular to center line A-A of the vehicle 10 and which is located by the position of the centering spring. Also, the remote control device 46 can generate a control signal which is transmitted over a separate channel or frequency band to the receiver 42, which signal is then used by the controller 40 to actuate mechanism 38 and initiate movement of the control arm 76, thereby steering the vehicle 10, as desired.

In order to allow the vehicle 10 to spin or rotate rapidly about a vertical axis while in a wheelie position, where the front end 14 and front wheel 28 are raised off of the rolling surface S supporting vehicle 10, the vehicle 10 further comprises a cam member 80 disposed between the rear wheels 24, 26 in a first position so as to extend to a point past or beyond the rear wheels 24, 26 (see Fig. 2) at the rear end 16 of the vehicle 10. The cam member 80 is located closer

to one of the pairs of rear wheels 24, 26 so that when the vehicle 10 is in a wheelie position (Fig. 7), the cam member 80 contacts the rolling surface S, thereby lifting the closer one 26 of the pair of rear wheels off of the rolling surface S. Then, continued rotation of the other, rolling surface contacting wheel 24 causes the vehicle 10 to rotate generally about the cam member 80. The cam member 80 may comprise any rigid material capable of supporting the vehicle 10 and also capable of contacting the rolling surface S without deforming when the vehicle 10 performs a wheelie. In the presently preferred embodiment, the cam member 80 is an integral protrusion extending from the rear end 16 of the chassis 12. The cam member 80 preferably is positioned proximate to the inner side of one of the rear wheels, the left rear wheel 26, in the embodiment shown, so that action of the right rear wheel 24 will cause the vehicle 10 to pivot generally about the cam member 80 when the vehicle is in wheelie position, generally vertical on its rear end.

Although in the presently preferred embodiment, the cam member 80 is fixed, the cam member 80 could be movable between a first rolling surface contacting position indicated by cam member 80 in Fig. 2, and a second position recessed within the vehicle 10, for example, as indicated in phantom at 80' in Fig. 2, where line S'(also in phantom), is tangent to rear wheels 24, 26 and support bar 64 and represents a rolling surface which would be contacted by the rear of vehicle 10 during a wheelie in the absence of cam member 80. Making the cam member 80 movable allows the vehicle 10 to be driven while in the wheelie position, as opposed to spinning in place when

in the wheelie position with the cam member 80 contacting the rolling surface S. The cam member 80 could be connected to a lever arm and a solenoid or a biasing means for moving the cam member 80 into a position to allow the vehicle to perform a spin. For example, a separate channel or frequency band can be used to provide a control signal from the remote control device 46 to the controller 40 to move the cam member 80 between a first position and a second, recessed position, as desired.

While the essential features of the invention have been disclosed and described above with respect to a preferred embodiment, one of ordinary skill will appreciate that the invention may assume any of a wide variety of configurations. The foregoing disclosure is meant to be exemplary and not limiting. For example, although the embodiment shown in Figs. 1-4 has two large rear wheels and a single, smaller front wheel, the toy vehicle could have two rear wheels and two front wheels. The vehicle could also have only one front wheel and one rear wheel (*i.e.*, a motorcycle). In addition, the diameter and the ratio of the diameter of the rear wheels to the front wheels could vary. Also, steering by differential drive of the rear wheels 24, 26 could be implemented, as opposed to having a pivotable front wheel 28. One of ordinary skill will appreciate yet other modifications, arrangements, structures and modes of operation would be possible to achieve the ultimate purpose of providing a vehicle able to perform roll overs and a spinning wheelie. It is to be understood, therefore, that the invention is not limited to the particular embodiments disclosed or suggested,

but is intended to cover any modifications which are within the scope and spirit of the invention, as defined by the appended claims.

CLAIMS

1. A remote control toy vehicle (10) operable on a rolling surface (S) and including:

a chassis (12) having a front end (14), a rear end (16), and two opposite lateral sides (18,20);

a body (22) coupled with the chassis;

at least one rear wheel (24) mounted proximate the chassis rear end for rotation relative to the chassis;

a front axle (34) mounted proximate the chassis front end, the front axle having at least one front wheel (28) mounted for rotation thereon relative to the chassis; and

a motor (36) drivingly coupled with the at least one rear wheel; the vehicle being characterized by:

a curved roll bar (60) extending from the opposite lateral sides of the chassis along the opposite lateral sides and over the top of the chassis and the body, spaced away from the body along the top and sides of the body.

2. The toy vehicle of claim 1 further characterized by a rear axle (30) mounted proximate the chassis rear end and a second rear wheel (26), the at least one rear wheel and the second rear wheel being mounted on the rear axle for rotation relative to the chassis proximal to the opposite lateral sides of the chassis and the motor being drivingly coupled with each of the two rear wheels.

3. The toy vehicle of claim 2 further characterized by a cam member (80) disposed between the rear wheels in a first position so as to contact the rolling

surface (S) when the vehicle is in the wheelie position with the front wheel raised sufficiently off the rolling surface, the cam member being located closer to one of the rear wheels (24) to lift the closer one of the rear wheels off of the rolling surface and thereby cause the vehicle to rotate generally about the cam member by action of the other rear wheel.

4. The toy vehicle of claim 1 further characterized by a vehicle power supply (32) mounted above the at least one rear wheel toward the rear end of the vehicle.

5. The toy vehicle of claim 4 further characterized by the vehicle power supply (32) being removable from a remainder of the vehicle and a tray (54) mounted to receive and support the power supply and a locking clip (56) located to releasably retain the power supply in the tray.

6. The toy vehicle of claim 5 further characterized by:

a controller (40) responsive to control signals received from a source (46) remote to the vehicle, the controller being coupled with the power supply and the motor to selectively control operation of the motor; and

a radio receiver (42) coupled with the controller.

7. The toy vehicle of claim 1 further characterized by the front axle having two ends, one free end

(70) and a second opposing end (72) pivotally coupled with at least one of the chassis and the body.

8. The toy vehicle of claim of claim 7 further characterized by a control arm coupled with the axle between the two ends and a steering device (38) coupled with the control arm.

9. The toy vehicle of claim of claim 7 further characterized by the front wheel being located along a longitudinal centerline of the vehicle extending between the front end and the rear end.

10. The toy vehicle of any of the claims 1-9 further characterized by the roll bar being generally circular and circumscribing the lateral sides and top of the chassis and the body.

11. The toy vehicle of any of the claims 1-9 further characterized by the roll bar extending in an arc of more than 180 degrees around the body and chassis.

12. The toy vehicle of any of the claims 1-9 further characterized by the roll bar extending from the opposite lateral sides of the chassis proximate a center location along the chassis and a second roll bar (66) extending from the opposite lateral sides of the chassis and along the opposite lateral sides and over the top of the vehicle proximate the rear end of the chassis.

13. A toy vehicle (10) for operating on a rolling surface (S) including:

a chassis (12) having a front end (14), a rear end (16), and two opposite lateral sides (18,20);

a pair of rear wheels (24,26) mounted proximate the chassis rear end, the rear wheels being mounted on the opposite lateral sides of the chassis for rotation relative to the chassis;

at least one a motor (36) drivingly coupled with at least one of the pair of rear wheels; and

a front axle (34) mounted proximate the chassis front end and having at least one front wheel (28) mounted for rotation thereon relative to the chassis, characterized by:

the front axle being the only front axle of the vehicle and being located in the middle of the front end between the opposite lateral sides of the chassis, the front axle having two opposite ends, a first, free end (70) and a second end (72) connected with a remainder of the vehicle by a pivot (74) for pivotable movement of the front axle relative to the chassis.

14. The toy vehicle of claim 13 further characterized by a control arm (76) having an end coupled to the front axle between the two ends of the front axle.

15. The toy vehicle of claim 14 further characterized by:

a power source (32) removably mounted above the pair of rear wheels;

a controller (40) responsive to control signals received from a source (46) remote to the vehicle and coupled with the motor and the pivot arm to selectively control operation of the motor and the pivot arm; and

a radio receiver (42) coupled with the controller to provide remote radio control of the motor and the pivot arm.

16. A toy vehicle constructed and adapted to operate substantially as hereinbefore described, with reference to, and as illustrated in, the accompanying drawings.

The Patent Office

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Application No: GB 9812171.8 **Examiner:** R A H CASLING
Claims searched: 1-12 **Date of search:** 30 September 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): A6S

Int Cl (Ed.6): A63H

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2318555 A	(IMTEC) see page 4 line 21 et seq	1 and 10 at least
X	GB 533428	(MARX) see page 6 line 91 to line 117	1 at least
X	US 4363187	(TOMY) see column 3 line 44 et seq	1,3 and 10 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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Application No: GB 9812171.8 **Examiner:** Roger Casling
Claims searched: 13-16 **Date of search:** 20 January 1999

Patents Act 1977
Further Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A6S

Int Cl (Ed.6): A63H

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 1390068	(LESNEY) see page 1 line 73 et seq	13
X	US 5372534	(LEVY) see 5 line 24 et seq and 6 line 38 et seq	13
X	US 5294153	(NOLAN) see 4 line 6 et seq and 5 line 28 et seq	13

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.